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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/814,570 | 03/31/2004 | Teng-Wang Huang | MAIKP131US | 6882 |

29393 7590 04/16/2007
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| EXAMINER |
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DEO, DUY VU NGUYEN

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| ART UNIT | PAPER NUMBER |
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1765

| SHORTENED STATUTORY PERIOD OF RESPONSE | MAIL DATE | DELIVERY MODE |
|--|------------|---------------|
| 3 MONTHS | 04/16/2007 | PAPER |

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/814,570

Applicant(s)

HUANG ET AL.

Examiner

Duy-Vu N. Deo

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 January 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over admitted prior art and in view of Chen et al. (US 6,468,362).

Admitted prior art teaches a wet etching method of a substrate to form deep trench for a DRAM cell comprising: etching the substrate in a first HF tank (claimed vessel); rinsing substrate in second tank; etching the substrate in a third NH₄OH tank; rinsing the substrate in a fourth tank; and drying the substrate (pages 1-2 of the specification). Unlike claimed invention, admitted prior art doesn't describe the first rinsing agent comprising at least one wetting agent. Chen describes a method for cleaning the substrate wherein the cleaning solution comprises of a surfactant (claimed rinsing comprising wetting agent) (col. 2, line 65-67; col. 7, line 7-20). It would have been obvious for one skilled in the art to modify admitted prior art in light of Chen by using a cleaning solution with a surfactant because Chen teaches that it would clean the substrate with minimal water marks and residues (col. 1, line 47-57; col. 10, line 31-36). Admitted prior art teaches of successively performing these etching and rinsing steps

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before the drying step (page 1, line 35-39). The wetting agent or surfactant would also provide the benefit of reduces a surface tension associated with the second etchant.

Referring to claims 6, 17, Chen describes the wetting agent concentration is 0.01-0.1% by V (claimed 0.01-0.1% by wt).

Referring to claims 7, 9, 18, 19, 20, admitted prior art describes the deep trench has aspect ratio of 50 or more are possible (page 1, line 30-35).

Response to Arguments

3. Applicant's argument that Chen teaches of rinsing the wafer with water and then drying the wafer is acknowledged. However, in another embodiment he teaches of rinsing with the solution that having surfactant and stopping before the surfactant is completely removed (fig. 1). Therefore, he does suggest keeping the surfactant on the wafer.

4. Applicant's arguments that Chen teaches of drying the wafer prior to performing any other process steps and that a combination would require two drying steps to be performed are found unpersuasive because he doesn't explicitly describe drying the wafer prior to performing any other process steps in the description. Even though he describes the cleaning process includes starting step of applying the cleaning solution and then the last step of drying; however, he doesn't teach that the drying step has to be done prior to performing any other steps. Furthermore, Chen is a secondary reference and the main reference or the main process described above concerns about a wet etching method to form deep trench, wherein the process includes rinsing steps. The drying step is done at the end of the whole process as described by the admitted

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prior art above. Therefore, one skilled in the art who forms a deep trenches would perform the drying step at the end of the whole process but not perform during the process since admitted prior art doesn't teach so.

5. Also, Chen describes with the surfactant containing solutions, the substrate can be effectively cleaned, rinsed, and dried with minimal water marks, not just during the drying of the wafer (col. 10, line 31-36).

6. In response to applicant's argument that the at least one wetting agent reduces a surface tension associated with the second etchant, the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

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extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Duy-Vu N. Deo whose telephone number is 571-272-1462. The examiner can normally be reached on Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Duy-Vu N Deo

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Primary Examiner
Art Unit 1765

04/12/07

A handwritten signature in black ink, appearing to be 'J. V.', located below the text 'Primary Examiner Art Unit 1765'.